

*Full Length Research paper*

# The prevalence and management of hypertension in a population of adults with type 2 diabetes in the Adamawa Region (Cameroon): A retrospective analysis

Olivier Pancha<sup>1,2\*</sup>, Adonis Koono Koono<sup>2</sup>, Euloge Yiagnigni<sup>3</sup> and Pierre Ndobu<sup>3,4</sup>

<sup>1</sup>Department of Biomedical Sciences, Faculty of Sciences, University of Ngaoundéré, Cameroon.

<sup>2</sup>Ngaoundéré Regional Hospital, Cameroon.

<sup>3</sup>Yaoundé Central Hospital, Cameroon.

<sup>4</sup>Faculty of Medicine and Biomedical Sciences, University of Yaoundé 1, Cameroon.

Accepted 14 June, 2012

**This study aimed to assess the prevalence, treatment and control of hypertension in adult Cameroonian population in Adamawa with type 2 diabetes. Medical files of patients under follow-up at the hypertension and diabetes Unit of the Ngaoundéré Regional Hospital (Adamawa Region, Cameroon) were evaluated over one year period from January 2008 to January 2009. Medical follow-up consisted of a regular monthly clinical evaluation, with measurements of anthropometric parameters and monitoring of blood pressure and fasting blood sugar. A total of 317 diabetics were surveyed in this study. The overall prevalence of hypertension was 60.3%. The prevalence of hypertension was higher for the female population (61.1%) as compared to male (58.6%). Overall, 36.7% patients (n=70) were treated for hypertension; only 5.7% of the treated patients had their blood pressure controlled. The commonly prescribed drugs were: alpha methyl dopa (26%), association reserpine and chlortalidone (25%), diuretics (22%), angiotensin-converting enzyme (ACE)-inhibitors (10%), and calcium channel blockers (8%). Our study indicates a low control rate of hypertension in Cameroonian diabetic patients in our setting and underlines the need for improving their blood pressure management with effective prevention of cardiovascular risk.**

**Keys words:** Hypertension, type 2 diabetes, prevalence, drugs, control.

## INTRODUCTION

Hypertension is the major share burden of cardiovascular disease in the world (Lawes et al., 2006). Available epidemiological data on hypertension in Cameroon indicate that its prevalence varies between 12 and 22% for subjects above 25 years (Mbanya et al., 1998; Kearney et al., 2004). At the same time, high blood pressure often occurs in association with diabetes for which, it is an extremely common comorbidity. Hypertension in diabetes is due to several pathophysiological mechanisms which include increased volume expansion, altered sodium homeostasis,

increased peripheral vascular resistance, hyperinsulinemia and lipid abnormalities, which have been associated with increased risk of cardiovascular disease (Sowers, 2003; Coccheri, 2007).

The presence of hypertension in individuals with diabetes increases the mortality 4-5 folds, largely through coronary artery disease and stroke (Sahay and Sahay, 2003). It is now well documented that the association between hypertension and diabetes increases the risk of cardiovascular disease that causes about 85% of deaths in diabetic patients (Arrauz-Pacheco et al., 2002). Therefore, acknowledgement of the prevalence of hypertension and blood pressure control in diabetic patients is important for health policy and public health strategy. In Cameroon, studies specifically addressing the prevalence, treatment and control of high blood

\*Corresponding author. E-mail: [olivierpancha@yahoo.fr](mailto:olivierpancha@yahoo.fr). Tel: 00 (237) 74 98 22 37.

**Table 1.** Prevalence of hypertension in diabetic patients according to age (N = 317).

Age (years)	Men		Women		All		P value
	N = 162		N = 155		N = 317		
	n	(%)	n	(%)	n	(%)	
20-29	2	(22.2)	2	(18.2)	4	(20.0)	0.83
30-39	10	(55.6)	10	(40.0)	20	(46.5)	0.33
40-49	18	(45.0)	23	(57.5)	41	(51.3)	0.27
≥50	65	(68.4)	60	(76.9)	125	(72.3)	0.21
Total	95	(58.6)	96	(61.9)	191	(60.3)	0.55

pressure in diabetic patients have taken little attention in northern areas of the country. This research was undertaken to assess the prevalence, management and control of hypertension in a population of adult Cameroonian diabetics in the Adamawa region (northern Cameroon).

#### MATERIALS AND METHODS

The study was conducted at the hypertension and diabetes Unit of the Ngaoundéré Regional Hospital (Adamawa, Cameroon). The target population consisted of patients registered for the first time or old cases on monitoring. During the study period (January 2008 - January 2009), clinical examinations were carried out and laboratory parameters were measured for all the patients; these included: sex, age, fasting blood sugar, blood pressure, weight and height. When necessary, further investigations were performed.

Fasting blood sugar was measured in the morning after an overnight fast. One Touch Profile 1 blood glucose meter (LifeScan, Germany) calibrated for blood glucose measurements was used. Blood pressure (BP) was measured, according to World Health Organization (WHO) guidelines (Chobanian et al., 2003), on calm subjects in a sitting position. Three measurements were taken with 3 min intervals between consecutive measurements. An automatic sphygmomanometer brand OMRON HEM-705 Automatic CP was used to measure the blood pressure. Average systolic blood pressure (SBP) and diastolic blood pressure (DBP) were determined from the second and third measurements. In addition, all subjects were asked whether they were taking any medications for the treatment of hypertension or diabetes. The clinical data were collected and kept in the individual patient file and were also summarized in a collective register. This register served as the source of data for the present study. This study received approval from the administrative authorities of the hospital.

Hypertension was defined as SBP  $\geq$  140 mm Hg or DBP  $\geq$  90mm Hg or self reported use of antihypertensive medication, with adaptation of the recent WHO definitions (Chobanian et al., 2003). Controlled hypertension was defined as blood pressure < 140/90 mmHg. Patients of both sexes and responding to the diagnostic criteria of diabetes mellitus as defined by the American Diabetic Association (ADA) (American Diabetes Association, 2007) were included in the study. Patients less than 20 years old, patients with gestational hypertension, or hypertensive patients without diabetes and patient with type 1 diabetes were excluded.

#### Statistical analysis

Statistical analysis was performed using SPSS 12 version 12.01. Data were expressed as percentages, proportions and mean of standard deviation. A Student t test was used to discriminate

between the means. Significance level was considered at  $p < 0.05$  for all analysis.

#### RESULTS

In total, 317 patients with diabetes were included in the study (162 men and 155 women). Among these patients, 191 were diagnosed with hypertension, giving an overall prevalence of hypertension of 60.3%. The prevalence of hypertension increased steadily with age and was higher in female (61.9%) when compared to male (58.6%) regardless of age. The prevalence of hypertension in diabetic patients according to age is presented in Table 1. Diabetic hypertensive patients (n = 191) had a mean age of  $53.7 \pm 1.8$  years old and were predominantly female ( $p = 0.28$ ). Mean body mass index was  $26.2 \pm 0.8$  kg/m<sup>2</sup> and was statistically higher in women than in men ( $p = 0.02$ ). The mean fasting blood sugar was  $2.3 \pm 0.02$  g / l for the whole population. The average SBP and DBP were respectively  $160.9 \pm 4.3$  and  $94.5 \pm 2.3$  mmHg. There was no significant statistical difference between men and women with regard to level of blood pressure.

Among patients with hypertension and diabetes, 37.2% had systolic hypertension, while 14.7% had diastolic hypertension, and 48.2% both systolic and diastolic hypertension. Moreover, 36.7% (n = 70) of patients were under treatment for hypertension, 39 women (40.6%) and 31 men (32.6%) among these patients, only 5.7% (n = 4) had a blood pressure level below 140/90 mmHg at their most recent clinical evaluation. General characteristics of diabetic hypertensive patients are presented in Table 2.

The patients treated were subjected to dietary measures, and antihypertensive drug. The distribution of the most frequently prescribed drugs was: Alpha methyl dopa (26%), association reserpine and chlortalidone (25%), thiazide diuretics (22%), angiotensin-converting-enzyme inhibitors (ACE inhibitors) (10%), and calcium channel blockers (8%).

#### DISCUSSION

##### Prevalence of hypertension

Epidemiological data on hypertension in diabetics vary

**Table 2.** General characteristics of diabetic hypertensive patients (N = 191).

Parameter	Men N = 95	Women N = 96	All N = 191	P value
	Mean or n (%)	Mean or n (%)	Mean or n (%)	
Mean age (years)	54.7 ± 2.6	52.7 ± 2.5	53.7 ± 1.8	0.28
Fasting blood sugar (g/L)	2.3 ± 0.2	2.4 ± 0.3	2.3 ± 0.2	0.68
Age groups (years)				
20-29	2 (2.1)	2 (2.1)	4 (2.1)	1.00
30-39	10 (10.5)	10 (10.5)	20 (10.5)	1.00
40-49	18 (18.9)	23 (24.2)	41 (21.6)	0.38
≥50	65 (68.4)	60 (63.2)	125 (65.8)	0.45
Weight status				
BMI (kg/m <sup>2</sup> , mean±SD)	24.9 ± 1.0	27.5 ± 1.3	26.2 ± 0.8	0.002
BMI <25 kg/m <sup>2</sup>	54 (57.5)	34 (37.0)	88 (47.3)	0.005
25 kg/m <sup>2</sup> ≤ BMI ≤ 29.9 kg/m <sup>2</sup>	29 (30.9)	28 (30.4)	57 (30.7)	0.95
BMI ≥30 kg/m <sup>2</sup>	11 (11.7)	30 (32.6)	41 (22.0)	0.001
Blood pressure				
SBP mean (mmHg)	161.8 ± 6.2	159.9 ± 6.2	160.9 ± 4.3	0.66
DPB mean (mmHg)	95.2 ± 3.2	93.8 ± 3.4	94.5 ± 2.3	0.54
Treatment and control				
Treated subjects	31 (32.6)	39 (40.6)	70 (36.7)	0.10
Control among treated	1 (3.2)	3 (7.7)	4 (5.7)	0.43
Type of hypertension				
Isolated systolic	33 (34.7)	38 (39.6)	71 (37.2)	0.49
Diastolic	11 (11.6)	17 (17.7)	28 (14.7)	0.23
Systolic and diastolic	51 (53.7)	41 (42.7)	92 (48.2)	0.13

throughout the world in type and distribution, especially between the developed and the developing countries. In our study, the average age of diabetic hypertensive patients was 53.7 ± 1.8 years old, with a female to male ratio of 1.01. The female predominance reported in this work reflects African literature data (Mengesha, 2007; Damorou et al., 2008). The prevalence of hypertension in diabetic patients was 60.3%, which was close to the rates reported in Caucasian series (Geiss et al., 2002), but clearly higher than those previously described in other Sub-Saharan African countries (Dembele et al., 2000). This could be explained by methodological differences on the threshold used to define hypertension in diabetic patients. Since the threshold selected in this study was 140/90 mmHg, it can be assumed that the prevalence rate found is significantly underestimated taking into account the international recommendations fixing the optimal blood pressure level in the diabetic hypertensive at 130/80 mmHg (Ryden et al., 2007). As with other studies, the prevalence of hypertension increased with age, reaching its maximum in patients older than 50 years (Dembele et al., 2000; Mengesha, 2007).

### Drug therapy

In our series, thiazide diuretics, reserpine-chlortalidone association, central antihypertensives, angiotensin-converting enzyme (ACE) inhibitors and calcium channel blockers were used in the treatment of diabetic hypertensive patients. Our work indicates that alpha methyl dopa and reserpine-chlortalidone association are frequently used in our environment (51% of patients). Their low cost and the difficult socio-economic background may justify their widespread use. Paradoxically, ACE inhibitors have been used in 10% of patients giving them a modest place among the different classes of drugs used, despite their proven effectiveness in cardiovascular and renal prevention in diabetic patients (Yusuf et al., 2000; Maggioni, 2006; Cohn, 2007; Sharma and Weir, 2011); this is held in their high costs in our milieu. Probably for similar reasons, the treatment of hypertensive patients did not involve any angiotensin II receptors blockers whose renal protective effects have been demonstrated in patients with diabetes (Atkins et al., 2005; Murohara et al., 2012; Verdecchia et al., 2012).

The results of the present study suggest that therapeutic classes reputed for being effective on cardiovascular risk in diabetic patients are prescribed very little in our context on one hand, and on the other, the choice of treatment is still largely dependent on drug costs. Indeed, most therapeutic classes used in our series were also the least expensive.

### Control of treated hypertension

Results from many large-scale clinical trials have demonstrated that a strict control of systolic and / or diastolic blood pressure can significantly decrease cardiovascular events and stroke in diabetic patients (Hansson et al., 1998; Ravid and Rachmani, 2005; Holman et al., 2008). This suggests that optimal control of blood pressure is a priority in the management of hypertensive patients with diabetes. In this study, 36.5% (n = 70) of patients were treated and among them, only 5.7% (n = 4) had a blood pressure below 140/90 mmHg at their last clinical evaluation. The data obtained in our work indicate a sub-optimal control of blood pressure and corroborate those reported in the literature relating on difficulties of adequate control of BP in Africa (Ben et al., 2011), Asia (Azarisman et al., 2010) and the West (Geiss et al., 2002; Mann et al., 2009).

The most commonly reported factors in the literature explaining the low rate of control include the lack of adherence due to the silent nature of hypertension, an inadequate understanding of the therapeutic usefulness of measures of lifestyle (Ho et al., 2008), the coexistence of other pathologies (Turner et al., 2008) and the cost of treatment (Ohene Buabeng et al., 2004). In our context, the propensity to use central antihypertensive could be an additional element that could explain the low control rate observed in our series. Indeed, the use of centrally acting antihypertensive molecules can sometimes cause side effects altering the quality of patient's life, and results in a change or discontinuation of treatment (Jones et al., 1995). This decreased compliance is associated with poor blood pressure control. In addition, cultural and social influences could have contributed to the low rate of control observed. In our environment, most patients hardly accept the chronic nature of hypertension and are reluctant to take a long-term antihypertensive treatment.

This study should be considered in light of some limitations. Particularly, it consisted of a monocenter study whose results need to be confirmed in a larger scale. Furthermore, it concerns semi urban population, and consequently does not prejudice the prevalence, treatment and control of hypertension in diabetic patients in the rural setting where access to care is still difficult. Other possible sources of bias include lack of out of office blood pressure measurements. Nevertheless, no study on this subject has been carried out with a group of such an important number of patients in the Adamawa

region (Cameroon).

### Conclusion

High blood pressure in diabetics is common in our environment and the management of blood pressure in diabetic patients is suboptimal. This dual finding reflects the need for better management of hypertension in our diabetic patients with the aim of an effective prevention of cardiovascular risk. Further studies will be oriented towards the search for specific factors associated with low blood pressure control in our diabetic population.

### ACKNOWLEDGEMENT

Authors wish to thank the personnel of the hypertension and diabetes Unit of the Ngaoundéré Regional Hospital for their assistance in collecting anthropometric data and blood sugar data.

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